

MATH 330 – Discrete Mathematics – Spring 2025

Turn In Homework Assignment 3

100 Points

Due: Thursday February 27, 2025

Your turn in write up will be graded on neatness, clarity of exposition (notation and definitions) and cleverness, but MOSTLY correctness. There are 5 problems. Each problem is worth 20 points. You may ask me questions if you do not understand the problem. You may discuss the problems with others in class but the write up you turn in must be your OWN work. You may use the spread sheets we built in class or your own spread sheets, class notes or Chapters 1 – 4 from our textbook and Desmos but your conclusions from these MUST be in your write up in your OWN words. You can include tables from spread sheets and graphs from Desmos in your write up. Your write up must be turned in class and be stapled in the left corner if it is more than one page.

1. Use Newton's Method to give an approximation to $\frac{1}{\sqrt{7}}$ by first using Newton's Method or the Babylonian method to get an approximation to $\sqrt{7}$. Use google sheets to show your approximations for both cases. You can also present another way but show that it is cleverer.
2. Consider the recurrence relation $S_{k+1} = 2S_k + 3S_{k-1}$; $S_0 = a, S_1 = b$. What is $\lim_{n \rightarrow \infty} \frac{S_n}{S_{n-1}}$? Give the solution for (i) $a = 0, b = 1$ (ii) $a = 1, b = 1$. What is the difference in these two solutions? You can use google sheets to print out some of the first iterates to help you.
3. Assuming that each row of Pascal's triangle gives you 11^k where k corresponds to your numbering of the rows, show that the sum of the numbers in the row is 2^k for the first six rows.
4. Let $S = \{a, b, c, d, e\}$. Give all the subsets of S in a nice format that allows one to see the counting principle in terms of the cardinality of S and show that these numbers correspond to a row in Pascal's triangle.
5. There are two leagues of five teams each. Each team must play every team in their league twice and every team in the other league once. How many total games will be played? A number is not sufficient. You must show a procedure (algorithm) that gives that number. From this, give a formula if there are n teams in the first league and m teams in the second.